The Implementation of a Digital Business Strategy in Hospitals

A Case Study on Motives and Difficulties of Employees

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Abstract

In recent years digitalization has impacted most industries immensely. Organizations hope to increase their efficiency by improving communication and information exchange along the value chain while simultaneously reducing their costs. Even though the healthcare sector was quite late to follow, nowadays huge investments are made in this area to become patient centric, increase safety and reduce errors. Despite multiple studies analyzing how the digital hospital looks like and why digitalization is pursued, the human factor is often under-appreciated. Therefore, this case study aims to shed light on how employees perceive digitalization and the motives and difficulties in implementation they see. Our interviews with medical, administrative and IT staff of a hospital shows that even though the motives for digitalization are recognized, the impact of digitalization in the healthcare sector remains ambiguous to this day due to the challenges the industry is facing. Privacy issues, rejection on patient- and staff side and a lack of communication and guidance hinder the implementation of a digital business strategy. Additionally, our study reveals that technology is currently leading the process, which should not be the case as in a hospital the patient and therefore the processes that evolve around him should be in the center. Our implications and propositions help in solving these issues.

Keywords: *Digitalization, eHealth, healthcare, digital business strategy, hospital of the future*

Table of Contents

1 Introduction

The last decades were marked by substantial advancements in technology impacting most aspects of everyday life. Continuous progresses in hardware and software and an ever-demanding environment have changed substantially the way businesses operate. An effective combination of organizational, technological and environmental resources allows the development of online informational capabilities - an organization's ability to exchange information online and on-demand with customers as well as suppliers (Barua, Konana, Whinston, & Yin, 2004). Through the easier and faster information exchange, new knowledge can be obtained, which helps to understand the customers' and suppliers' needs better and thus increase their satisfaction. Therefore, the uncertainty concerning product and service requirements is decreased and organization's feel encouraged to conduct more value-chain activities electronically by increasing the use of technological means (Barua et al., 2004). This can be accomplished by the use of digitalization, which refers to the extent to which daily transactions and value chain activities are completed by electronic means (Barua et al., 2004). Hence, digitalization denotes the shift from accomplishing day-to-day activities such as exchanges with customers and suppliers in a digital instead of the traditional way (BarNir, Gallaugher, & Auger, 2003; Barua et al., 2004).

Digitalization is shown to benefit organizations in multiple ways such as through the obtainment of information, the enhancement of efficiency and the facilitation of customer centricity (BarNir et al., 2003). Through better information access and faster communication, organizations can manage their work more efficiently and effectively and reduce transaction, inventory or transportation costs depending on the use-case. Additionally, bureaucracy is lowered through less needed paperwork and less errors concerning false data input or even data loss (Barua et al., 2004). At the same time, new customers that are physically out of reach can be served through online service offerings, and the relationship with existent customers can be strengthened. Moreover, direct communication with customers and the provision of feedback are facilitated, which help to create a tailored user experience (BarNir et al., 2003; Barua et al., 2004).

Although most industries are primarily effected by digitalization and the similar emerging trends (Yoo, Boland, Lyytinen, & Majchrzak, 2012), digitalization and technological advancements have

had a profound impact on the healthcare sector. The enterprise value of the top eight US healthcare systems and services companies alone reached 40,145 billion US dollars in January 2017, showing the importance of this industry (Statista, 2017). In recent years, the healthcare industry has gone beyond merely digitalizing records and patient data. Nowadays, eHealth (electronic health) and mHealth (mobile health) are on the rise, allowing a safe use of information and communication technologies with the objective of increasing coordination and cooperation and therefore providing a personalized, high quality care (Hu & Bai, 2014; Schweitzer & Synowiec, 2012). While most industries are investing heavily in information technology (IT hereafter) and digitalization for many years already, the healthcare industry was late to follow.

Many factors are assumed to have had an impact on the healthcare sector lagging, such as the high upfront investments that need to be made despite the yet unknown efficiency and economic benefit of digitalization in the long run (Car, Black, Anandan, Pagliari, Cresswell, McKinstry, Bokun, Procter, Majeed, Sheikh, 2008; Cook, Manning, Holland, Prinsen, Rudzik, Roger, Deschamps, 2013; Groves, Kayyali, Knott, & Van Kuiken, 2013). However, the biggest concern that indeed confirms the resistance to change, involves data security and privacy issues (Car et al., 2008; Groves et al., 2013; Hu & Bai, 2014). Healthcare is a highly sensitive, personal and emotional topic, which results in patients feeling vulnerable and thus, it influences adaptability and willingness to share data (Anderson & Agarwal, 2011). Additionally, to reap off the benefits of digitalization and facilitate monitoring, planning and research, secondary use of data, which relates to the usage of patient data for clinical auditing, quality improvement or even public health monitoring, is inevitable. This however, raises many ethical concerns and technological challenges (Car et al., 2008).

Despite these challenges, the healthcare sector has recently started adapting to the changing environment by increasing IT investments and engaging in digitalization efforts. In light of years of resistance, the questions that need to be asked are *"Why did healthcare providers start investing in digital infrastructure?"* and *"How are digitalization activities implemented inside hospitals?"*. Multiple studies that shed light on the necessity for digitalization and presumed benefits exist. However, as Car et al., (2008) put it human factors are often underappreciated. While many studies deal with the clinical and economic impact digitalization efforts might have, the socioeconomic

perspective is mostly adopted without incorporating the employee perspective. However, to understand developments, changes and the dynamics in the working environment, the employees' opinions are needed. Since they are the ones implementing the changes, their perception is of great value to understand processes and the drivers for digitalization. Besides gaining more understanding on the topic, research in this direction might also help determine what motivates employees and how changes need to be communicated. Thus, the sub questions that are formulated are *1. "In how far do employees see the necessity to digitalize and do their perceived motives match with what institutions and studies tell us?" 2. "How does the employees' working environment change?"* and *3. "How does the implementation of digitalization look like? Is a strategy in place? How is it spread throughout the organization?"*

Moreover, little is known yet about the effectiveness of digitalization in the healthcare sector, and mixed evidence exists. Scholars argue that the effectiveness of digitalization depends heavily on the implementation process (Car et al., 2008). Although a few studies on the implementation of a digital business strategy exist, little field research that shows concrete obstacles in implementation has been conducted. Therefore, the sub question *4.* "*Which challenges do employees see in implementing digitalization in hospitals?"* is asked.

For digitalization to work, all stakeholders need to cooperate. This means, that physicians and patients must be both willing to adapt to the system and learn how to use it. Lots of evidence exists on user resistance however, most studies adopt the patient view. Nonetheless, digitalization reshapes staff's work fundamentally by empowering patients to become active stakeholders and communicate with their doctors at all times. Hospital staff has to adapt to many system changes and learn to deal with new technologies. Since mixed evidence on employee rejection and the reasons for it exists, the sub question that arises is *5. "Does user resistance exist on the employee side and what are the reasons for it?"*.

To answer the research questions and the sub questions, the Dutch healthcare environment is reviewed. Next to Scandinavian countries, the Netherlands are one of the most digitalized countries in Europe scoring high on dimensions such as connectivity, human capital and digital public

services (European Commission, 2017). A concrete overview of the ranking and the dimensions is provided in figure 1 below.

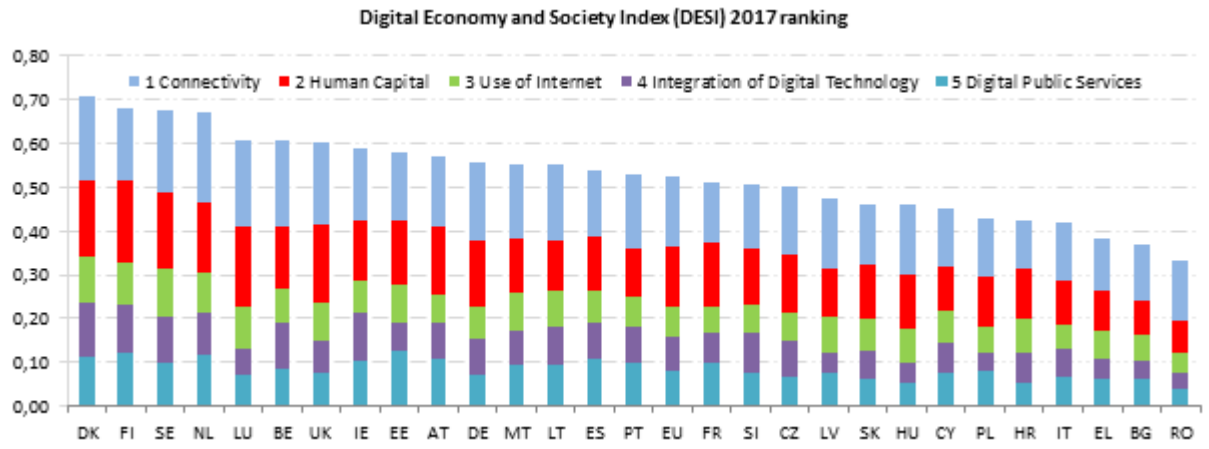

Figure 1: The Digital Economy and Society Index (DESI) (European Commission, 2017)

Comparing the scores the Netherlands achieve in the different dimensions to each other, one realizes that the integration of digital technology is still relatively low. For this reason, an investigation of how this integration is achieved in the healthcare setting is particularly interesting and is examined throughout this paper. In conclusion, the purpose of the study is threefold. This paper aims to i) shed light on the perceived motives for digitalization in hospitals, ii) to understand how the implementation is handled and iii) to gain practical insights into difficulties of implementation always adapting the employee perspective.

In order to do so, first, existing literature on the topic is reviewed. Second, the context of the study, the sample and the measures are described in the methodology section to explain how the discussed results were generated. Additionally, propositions for future research are developed. Lastly, a conclusion is given including limitations of the study and suggestions for future research.

2 Literature Review

Healthcare is considered to belong to the most technology-intense industries (Kaushal, Blumenthal, Poon, Jha, Franz, Middleton, Glaser, Kuperman, Christino, Fernandopulle,

Newhouse, Bates, 2005). Despite this fact, while digitalization in other industries is quite mature, the healthcare sector was lagging for years. Figure 2 below lists several industries and dimensions such as digital spending, transactions and business processes. ICT[1] scores highest and is thus considered the most digitally mature sector closely followed by media, professional services and finance and insurance. All of these sectors are very knowledge intense. At the other end agriculture and hunting, construction, hospitality, the government and healthcare can be found, being the least digitally advanced sectors.

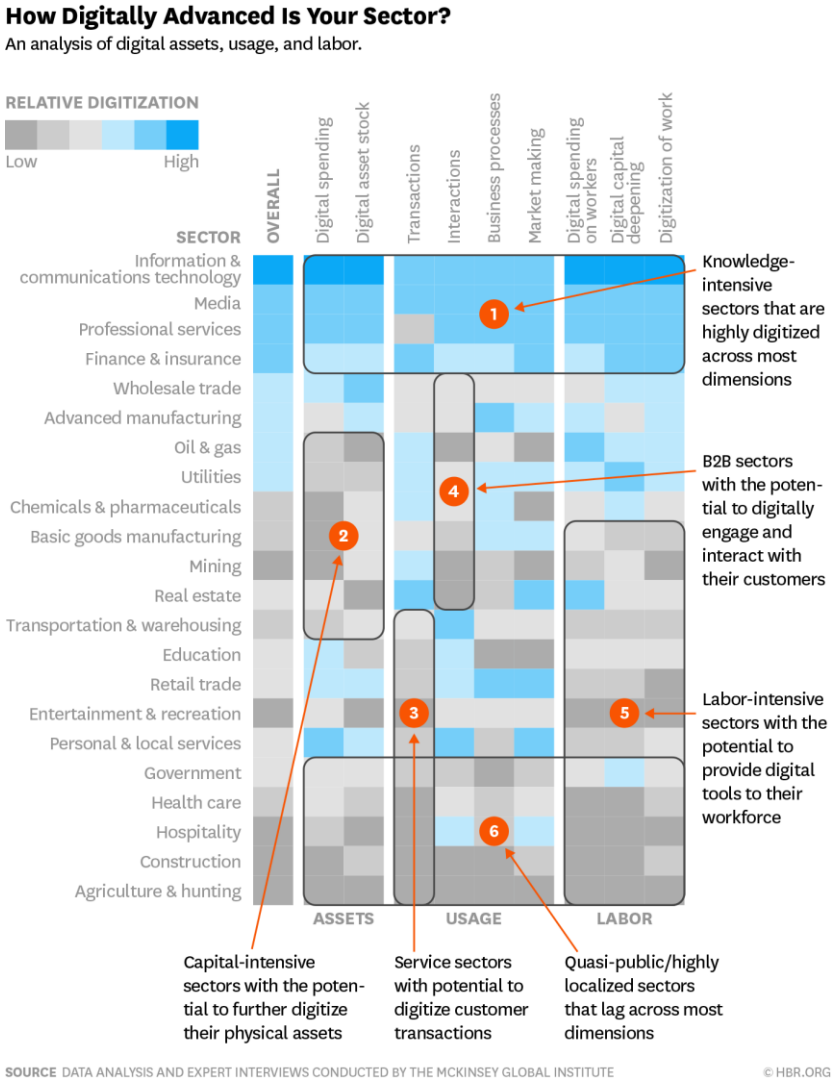

Figure 2: Digital advancement across industries (Gandhi, Khanna, & Ramaswamy, 2016); adapted from the McKinsey Global Institute

[1] Information and Communication Technology

Digitalization in the healthcare setting started in the beginning of the 2000s with prescriptions for medication in digital form, websites and information that could be found online. With the slow rise of electronic patient records (EPR[2] hereafter) and the electronic patient dossier (EPD hereafter) first opinions on eHealth (electronic health) were voiced as early as the 90s. Nevertheless, today, almost 30 years later, these topics are still discussed and neither the EPD nor eHealth initiatives have been widely adopted and the direction of their long-term impact remains unknown.

eHealth is defined as "the cost-effective and secure use of information and communications technologies in support of health and health-related fields, including healthcare services, health surveillance, health education, knowledge and research" (WHO, 2017). Hence, it combines health care records in a digital form with information systems (Car et al., 2008). The concept of eHealth covers various domains such as informatics (consumer, medical and public health), clinical decision support systems, mobile health, telehealth and telemedicine (Hilberts & Gray, 2014; Neuhauser & Kreps, 2010) with the goal of facilitating and enhancing coordination and cooperation in healthcare to ultimately provide high quality care at lowered costs (Hu & Bai, 2014).

Regardless of the terms telemedicine or telehealth and eHealth being often used interchangeably, telemedicine is in fact defined as the use of telecommunications to exchange medical information and provide an improved service to the patient (American Telemedicine Association, 2012; Raju & Prasad, 2012). It is thus considered simply a part of eHealth (de la Torre Díez, Garcia-Zapirain, Méndez-Zorrilla, & López-Coronado, 2016; Yeow & Goh, 2015) and is treated as such hereafter.

Digitalization thus, is a wide topic ranging from rather small changes such as the use of digital devices like computers at the work place to highly complex products such as robotics, 3D printing, artificial intelligence etc. eHealth is placed somewhere in between and is simply a part of the whole. Nevertheless, it is one of the strategically most important topics for the healthcare sector right now and is thus discussed in greater depth throughout the paper. A visualization of the digitalization landscape is provided below.

[2] The EPR or EPD is a data base including all information on the patient's health such as previous illness, prescriptions etc.

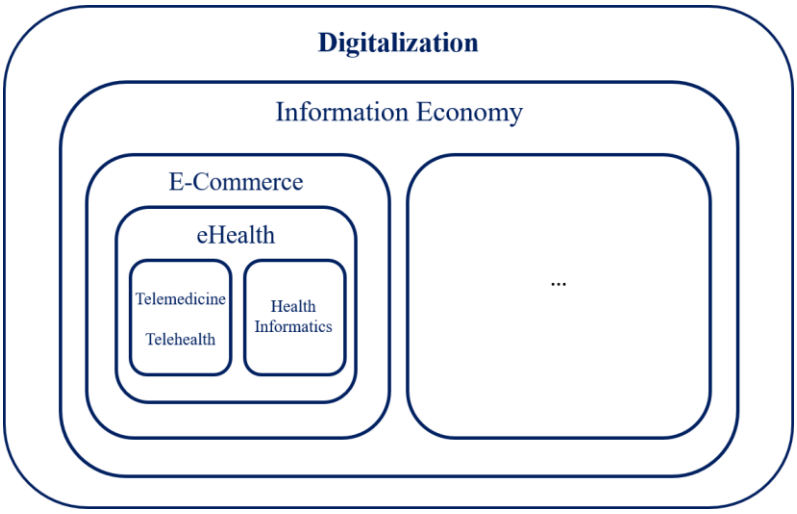

Figure 3: Digitalization landscape adapted from "The cost effectiveness of telemedicine enhanced by embracing e-health" (Mitchell, 1999)

The figure shows how different disciplines relate to each other. Telemedicine, telehealth and health informatics are smaller parts of eHealth. In the last decade, the EHR, which can be considered part of health informatics, has gained in importance and is therefore mentioned several times in later parts of the paper. eHealth is regarded as a branch of e-commerce, which deals with the conduction of business and business transactions electronically. All of these are part of the information economy, which the authors describe as the new possibilities that arise through developments in information technology concerning social and business interaction (Mitchell, 1999). In recent years, new disciplines like big data have been added to the landscape. Since they are secondary to this study, they are not described in figure 3 above. Digitalization can be considered the overarching theme here and central to this paper.

Many studies reveal the positive impact digitalization can have on organizations and consumers. Thus, unsurprisingly, investments are increasingly made in digitalization initiatives. Through digitalization, new capabilities can be developed that bring new benefits to the organization, help in competitive positioning and the fulfillment of strategic objectives (BarNir et al., 2003). Three categories of advantages of digitalization can be distinguished: information gathering, an increase of efficiency, and a stronger focus on the customer (BarNir et al., 2003). All three are closely linked to each other.

With the rise of the internet, information gathering has been facilitated, allowing the obtainment of large quantities of data (Cronin, 1995). Organizations can use this information to understand and serve the customer better than before on the one hand and to collect data on the environment and the competitive landscape on the other (Hoffman, Novak, & Chatterjee, 1995). Among others, digitalization of activities linked to information processing is positively related to innovation and efficiency (BarNir et al., 2003). Efficiency is understood in this case as the ability to cut unnecessary costs through better coordination and improved transactions with suppliers (Auger & Gallaugher, 1997; Straub, Hoffman, Weber, & Steinfield, 2002). Additionally, digitalization reduces bureaucracy and the number of administrative tasks, which also reduces costs (Auger & Gallaugher, 1997). Ultimately, products and processes can be controlled better and optimize material movement (Srinivasan, Kekre, & Mukhopadhyay, 1994), lowering lead times and reducing errors (Clemons, Reddi, & Row, 1993) by overcoming restrictions of time, distance or function. In the case of a physician specifically, this means an improved workflow (Noffsinger & Chin, 2000).

New electronic prescription management systems improve communication and transactions between doctors, pharmacists and patients, increasing the speed with which information is exchanged while simultaneously decreasing the risk of errors involved with the prescription of a wrong dosage of medication or even an entirely wrong medication (Car et al., 2008; Noffsinger & Chin, 2000). Documentation as well as information exchange, can thus be more accurate improving clinical decision-making (Car et al., 2008). All in all, digitalization and the use of eHealth are said to reduce errors and closely linked with that costs while improving healthcare provision (PricewaterhouseCoopers, 2005) benefitting not only the organization itself but setting an increased focus on the patient, which was the third category of benefits of digitalization identified above (BarNir et al., 2003).

Providing their services online, organizations can enhance their customers' experiences increasing their overall satisfaction (Balasubramanian, Prabhudev, & Nirup, 2003) and in the long-term their loyalty (Rust & Zahorik, 1993). Through the Internet, new ways of direct and personalized communication can be explored (Auger & Gallaugher, 1997) putting the customer in direct control of the content, order and finally the duration of the flow of information (Ariely, 2000). By

overcoming the boundaries of location and time, new customers can be served as well (Evans & Wurster, 1999). These characteristics equally apply to the hospital setting by replacing the word customers with patients. Customization in this area includes the integration of patient data according to the patient's preferences. Data can be stored and reminders for appointments or actions that need to be taken can be directly received via phone or email (Neuhauser & Kreps, 2010). This type of communication and information exchange, is also considered to have an impact on the patients' knowledge and their confidence concerning health care and decisions they need to make (Åkesson, Saveman, & Nilsson, 2007). Patients thus feel empowered (Åkesson et al., 2007) and become active partners in their health, constantly informing themselves and keeping control (Rockmann & Gewald, 2015). In recent years, an increasing number of medical studies were conducted showing positive effects digitalization and the use of new technologies had on prevention and treatment. In a literature review on monitoring and chronic heart failure, the authors find that telemonitoring systems are mostly used in prevention (de la Torre Díez et al., 2016). These systems are improving quality of life, reducing admissions to hospitals and mortality rates while being more cost-effective in monitoring and managing patients. Doctor-patient communication has changed and will continue changing in the future. Patient data is stored and can be shared among practitioners the patient visits reducing bureaucracy and facilitating diagnosis. In some cases, even the patient will be able to access his data in the future (Weiner, 2012). Overall, patients perceive the relationship with their physician to be stronger (Åkesson et al., 2007).

Research suggests that digitalization might affect the relationship between physicians and patients in three ways. First, the physician and the patient might work together to filter and analyze relevant information. This form of relationship is called patient-centered (McMullan, 2006). Nevertheless, although patients seem in favor of digitalization and being able to communicate with their care professionals more, they are also sensitive and do not want to invade their physician's private time (Weiner, 2012). Second, the physician might guide their patient to the right and reliable information sources. Third, the physician might feel threatened by the informed patient and try to defend himself by emphasizing his expert opinion. This form of relationship is called professional-centered (McMullan, 2006) and is explored in greater depth in a later chapter. With these changes in communication and the facilitated obtainment of information, not only the service experiences

change but also the patients' and the physicians' expectations. Consequently, the whole working environment changes (Hilberts & Gray, 2014). As digitalization deals with both, the integration of new technology into the organization and its combination with prevailing processes it is considered both, a product and a process (Roberts & Grabowski, 1999) and it drives strategy but is also driven by it (BarNir et al., 2003). Therefore, health care practitioners need to see digitalization as a strategic choice (Yeow & Goh, 2015).

2.1 The Implementation of Digitalization - A Strategic Choice

In recent years, organizations realizing the benefits of digitalization have started using it as a support in order to reach strategic objectives (BarNir et al., 2003; Bharadwaj, Sawy, Pavlou, & Venkatraman, 2013). According to Bharadwaj et al., (2013), digitalization is reshaping business strategy and improving work fundamentally by overcoming burdens such as time, function or distance and tightening social relationships internally as well as with the customer through the use of social media and networks (Grover & Kohli, 2013; Straub et al., 2002). Barua et al. (2004) show that IT alone does not increase an organization's value. It is rather its combination with additional organizational and environmental resources which makes it unique (Barua et al., 2004). As a consequence, it is suggested that IT should not be seen as a simple function serving overall business strategy anymore but rather be part of it as a so called "digital business strategy" (Bharadwaj et al., 2013).

A digital business strategy refers to the degree to which organizations engage in IT activities (Mithas, Tafti, & Mitchell, 2013; Woodard, Ramasubbu, Tschang, & Sambamurthy, 2013). The authors suggest that organizations diverge from the industry average regarding IT investments in turbulent industries, which are characterized by high instability with frequent entries and exits (Mithas et al., 2013). According to Mithas et al. (2013), this is because the industry norm does not represent a reliable indicator for future success. On the other side, they converge towards the industry norm when a high industry concentration and an increased industry growth are in place (Mithas et al., 2013). Following this line of argumentation, organizations benchmark with industry peers in times of uncertainty to determine their strategy (Mol & Birkinshaw, 2009). According to Bhaharadwaj et al., (2013) a digital business strategy is different from a traditional IT strategy as it is rather a cross-functional or even trans-functional strategy combining several functions such

as marketing, operations and logistics. With an increasing digitalization, it is suggested that the digital business strategy will not be a separate entity but converge into the business strategy in the future (Bharadwaj et al., 2013). In this way, organizations can differentiate themselves from competitors or raise the demand to adapt to competitive standards (Drnevich & Croson, 2013; Mithas et al., 2013). Organizations engaging in a digital business strategy need to constantly balance stability to absorb economic rents, which can then be reinvested in innovation, with flexibility in order to respond to the changing environment and market conditions (Woodard et al., 2013). In the long-term the ability of reorientation by implementing new strategies and structures will become crucial for success (Pagani, 2013). Within the next decade, it is expected that face-to-face contacts between patients and their physicians decrease, while electronic media gain importance, facilitating cooperation between physicians around the world and providing the possibility of 24/7 service delivery (Weiner, 2012). For this reason, simply investing in IT activities is not enough as IT alone only indirectly increases organizational performance (Barua et al., 2004). It is rather the effectiveness of implementation playing a crucial role (Brynjolfsson & Hitt, 2003).

Several factors need to be taken into consideration for a successful implementation. First of all, a clearly formulated strategy with defined short-term goals to support the long-term vision needs to be in place (Stroetmann, Jones, Dobrev, & Stroetmann, 2006). The benefits of digitalization take some time to show and therefore a long-term perspective is important. Questions that need to be asked include in how far eHealth initiatives might improve health care service provision and if they are compatible with current needs, show a low complexity and are easy to understand. In case they can also be tried out before committing to them and benefits are observable (Olok, Yagos, & Ovuga, 2015), the strategy should be pursued. Second, in order to capture the full benefits of digitalization, organizational, clinical and operational changes need to be made. For this reason, a well-organized change management is key (Stroetmann et al., 2006). Third, stakeholders such as health professionals, patients and authorities need to be involved and committed (Stroetmann et al., 2006). Stakeholder behavior might greatly impact the implementation of digitalization with the different parties acting according to their own motivations and perceptions (Klöcker, 2014). Therefore, benefits and costs for all stakeholders need to be reassessed on a regular basis (Stroetmann et al., 2006). As personnel with IT experience tends to show a more positive attitude

toward new technologies, their involvement might benefit the organization (Ward, Stevens, Brentnall, & Briddon, 2008). Lastly, clinical leaders are crucial to carry out the strategy and changes that need to be made. These clinical leaders, need to be supported by multidisciplinary teams that are constantly trained (Good & Stone, 2000; Stroetmann et al., 2006) as IT managerial skills are considered a source of competitive advantage (Mata, Fuerst, & Barney, 1995).

Even though the application of the aforementioned topics significantly help in the execution of digitalization efforts, it is no guarantee for success. The benefits of digitalization and EHR systems largely depend on the quality of implementation and the integration of decision support processes (Car et al., 2008). Despite eHealth applications constantly increasing, the general understanding of why certain interferences do or do not work remains insufficient (Shepperd, Lewin, Straus, Clarke, Eccles, Fitzpatrick, Wong, Sheikh, 2009). For this reason, possible bottlenecks and challenges impacting implementation need to be carefully reviewed.

2.2 Challenges in Implementing Digitalization

Regardless of the many positive theoretical benefits digitalization and EHR systems show, evidence on their effectiveness greatly varies (Car et al., 2008). Digitalization of areas such as marketing, advertising, sales and customer support for example can be even negatively related to innovation and efficiency (BarNir et al., 2003). Although, being the first-mover might yield many benefits and increase the organization's visibility, which can help in forming strategic partnerships (Barua et al., 2004), this visibility also incentivizes competitors to imitate (Grover & Kohli, 2013). Therefore, openness has to be balanced with information protection and customization (Grover & Kohli, 2013).

Besides the mixed opinions concerning the effectiveness of digitalization, discrepancies also exist with regard to long-term economic evaluation and costs (Car et al., 2008; Cook et al.). There are studies where no evidence supporting the cost-effectiveness claims is found (Catwell & Sheikh, 2009) and another study shows that innovation related to technology has even increased unit health care costs in rich countries (Beever, Burns, & Karbe, 2004).

The largest challenge however, remains the limited attention paid to human factors (Car et al., 2008) that include both, patients and health care providers. A greying population can be observed in most developed countries. As the need and demand for healthcare rises with increasing age, elderly people are often the heaviest users of healthcare systems (Rockmann & Gewald, 2015). However, rejection of new technologies is also highest among these ages. Reasons for that include on the one hand the elderly's anxiety related to IT and on the other hand their decreased cognitive capacity to deal with these complex systems (Tams, Grover, & Thatcher, 2014). Additionally, literacy needs to be taken into consideration (Cook et al.). Due to novel technologies, usually being designed by younger people, systems do not reflect the elderly peoples' needs accurately (Rockmann & Gewald, 2015). Rockman and Gewald (2015) suggest that as elderly people cannot be clustered into a homogenous group, more effort needs to be spent into understanding who these people actually are.

Healthcare is a very personal and very emotional topic. Consequently, one of the most difficult issues concerning digitalization is data security. Individuals may not want to share their personal data (Anderson & Agarwal, 2011) and if they decide to do so they constantly have to balance benefits with costs and trust with concern (Dinev & Hart, 2006). Since each patient's health status is unique, his perceived loss is also unique (Anderson & Agarwal, 2011). Voices are also raised with regard to the ethics involved due to the fact that secondary data is used for digitalization efforts such as the EHR (Car et al., 2008). Furthermore, legal issues might arise with the use of sensitive data, especially when this data is stored in the cloud (Hu & Bai, 2014). Some health information is thereby considered more sensitive than other and is thus protected legally stronger (Beckerman & Foundation, 2008).

On the employee side, there are also concerns of different nature. In a study by the consulting firm PricewaterhouseCoopers (PWC) (2005) it was shown, that healthcare professionals that have to use technology and for example eHealth systems are not adequately trained or supported to do so. As a result, adoption among practitioners and therefore the obtainment of benefits takes longer than expected. Using the theory of the productivity paradox, increasing IT intensity is related to decreasing managerial satisfaction due to the inflated expectations of the benefits IT brings and their disappointment when these are not fulfilled (Teo & Wong, 1998). Another reason for the

benefits not being fully realized in a timely manner is that systems are not used as intended with data often being entered subsequently into the system instead of during the actual transaction (Venkatesh, Zhang, & Sykes, 2011). Digitalization requires user acceptance to be effective. If users do not adapt to the system and do not use it as intended not enough data can be collected and costs will most likely increase rather than decrease due to the upfront investments that were made (Landis-Lewis, Manjomo, Gadabu, Kam, Simwaka, Zickmund, Chimbwandira, Douglas, Jacobson, 2015).

Although rather underrepresented in studies, employee rejection of digitalization is similar to the patient side an issue that needs to be considered. Kane and Labianca (2011) talk about IS (information system) avoidance and find that the IS avoidance by doctors specifically is a major reason why industry wide developments are rather slow. Similarly, it is found that doctors are generally not willing to make changes to their daily practices (Anderson, 1997; Bhattacherjee & Hikmet, 2007). Studies show that the fear of losing power is one major reason for that (Bhattacherjee & Hikmet, 2007). Additionally, a general resistance to change exists as professionals prefer to use their own judgement and expertise and make decisions independently of any systems or protocols based on for example big data (Groves et al., 2013).

Since opinion leaders play a critical role in the diffusion of technology (Venkatesh et al., 2011) as identified above, leading doctors with a negative perception of technology might impede the diffusion of new systems. Doctors that are less central and do not have a large network with many connections on the contrary are more likely to support the diffusion due to their enabled better access to resources. At the same time, nurses and administrative staff are found to be rather positive toward the use of technology as they feel empowered and are able to better coordinate and cooperate with other parties in healthcare (Jensen & Aanestad, 2006). Administrative staff is also enabled to monitor and control the actions of doctors. Thus, they can be held responsible for their actions more easily (Doolin, 2004). Overall, it is important to not forget that as employees' jobs are impacted and change, they themselves also change, which might bring unintended results (Halford, Obstfelder, & Lotherington, 2010).

Lastly, one important difficulty in the implementation of digitalization is the absence of a national agenda (Hilberts & Gray, 2014; J. W. Hill & Powell, 2009). Hill and Powell (2009) identify a national agenda to be an important solution to solve problems in healthcare. Additionally, a national healthcare information network is considered key in improving quality of healthcare while reducing costs (Hill, Langvardt, & Massey, 2007). For real change to happen, public policies that are supported by the industry and strategically implemented by governmental agencies are needed (Hilberts & Gray, 2014). That means that a cooperation between different stakeholders is essential.

Summarizing the main conclusions drawn from studying the literature on the topic, three broader areas of interest are identified. First, digitalization is currently a trend topic prevailing in most industries and increasingly in people businesses. Many benefits are associated with the introduction of digital activities such as cost reductions, efficiency increases, an improved information exchange and a higher customer satisfaction. In the healthcare setting specifically, patient empowerment and patient safety through a higher availability of information and data are considered the most important advantages. To realize these benefits and positive effects digitalization can have on an organization, a digital business strategy, which is the second area of interest, needs to be in place. This strategy and objectives need to be communicated to all employees and change should be encouraged. However, many organizations struggle with that leading to the third area of interest, which entails the difficulties of implementation. On the one hand, and especially for the healthcare environment, the economic viability of digitalization in the long-run is unknown. On the other hand, digitalization can even increase costs due to privacy restrictions prohibiting information exchange and the use of sensitive data. Not only laws and regulations represent a barrier but also patients themselves not feeling comfortable with the many activities being conducted electronically while they do not understand the procedure. Additionally, medical staff is likely to reject digitalization as their daily work changes and they feel that they are losing their power. All of these are areas that need to be considered for this research and are a starting point for developing the methodology.

3 Methodology

In order to deepen and combine the knowledge brought by the literature review, research needs to be conducted. In this chapter, the research procedure is described. First of all, the context and an overview of healthcare in the Netherlands is provided. Additionally, the research design including the sample and the measures used for the analysis is presented.

3.1 Context

The US as one of the world's most digitalized country (Breene, 2016), serves as a best practice case for many healthcare providers worldwide. With governmental support, private funding, strategic partnerships with conglomerates and sponsorships some of the most renown healthcare institutions were built representing the hospitals of the future. The Mayo Clinic and Virginia Mason among others are often looked up to for their digitalization and eHealth efforts and tightly coupled with that their patient centricity. Through new systems, mobile applications and the use of modern technologies, they have managed to improve direct communication with patients, securing timely feedback provision. Furthermore, they have optimized their processes, decreasing the patient's time spent within the hospital and increasing their satisfaction.

Even though many lessons can be learned by taking a glance at the US, the institutional environment is much more mature and greatly varies in comparison to other nations. Consequently, the US can be used as a best practice case to set targets and formulate strategies for the future. Nevertheless, its success and status as a role model make it hard to retrieve difficulties in implementation and managerial implications. As Europe is currently scaling up concerning digitalization, it is much more interesting to look at processes and developments in this area.

Despite not being a leader on a worldwide scale, the Netherlands count as one of the most digitalized and progressive countries regarding healthcare in Europe. The Atlas of eHealth shows the country's profile concerning the use and governmental support of digitalization in comparison to other countries (WHO, 2016). In the table below some facts are presented.

Country context*				
Population (000s)	16,759	Life expectancy at birth (years)	81
GNI per capita (PPP Int $)	43,210	Total health expenditure (% GDP)	12.9
Physician density (per 10 000 population)	3.15	ICT Development Index rank	7
Nurse & midwife density (per 10 000 population)	0.16	Mobile-cellular subscriptions (% population)	117.97
Hospital bed density (per 10 000 population)	47	Internet users (% population)	93

Table 1: Netherlands Country Context: Adapted from the Atlas of eHealth Country Profiles (WHO, 2016)

In the year 2015, total health expenditure counted for 12.9% of the GDP. The country has adopted a national eHealth policy/strategy since 2012 however, no national health information system, EHR system or telehealth policy/strategy exists. Funding exists in a variety of forms such as public, private and donor funding and also public-private partnerships are on the rise. Furthermore, many legal frameworks are in place contrary to multiple other countries. Solely legal frameworks for the individual access to health data in an EHR and the sharing of digital data between healthcare professionals in other countries are non-existent. Data seems generally to be a weaker topic as there is no policy or strategy for the governance of the use of big data in the health sector and by private companies. Nevertheless, only 17% and 8% respectively of all countries researched have such policies in place (WHO, 2016). Since the country is currently investing a lot in healthcare and is positioned strongly, it is chosen as topical scope for this paper. In order to understand the results and implications better, the healthcare environment and relevant stakeholders need to be sketched.

The Dutch healthcare system is strongly based on solidarity, granting access to care for everyone and providing high quality services. With the healthcare reforms of 2006 universal medical care coverage has been accomplished with the primary actor being the competitive and patient-centered insurance market instead of the government. Despite the government still regulating, monitoring and controlling, patient demand drives care quality now. In total, around 40 healthcare insurances exist from which patients can freely choose. The Dutch healthcare system is organized in three compartments with the second compartment facing major changes since the reforms (Daley, Gubb, Clarke, & Bidgood, 2013).

The first compartment covers long-term care for chronic conditions and is provided irrespective of the individual's financial situation. The second compartment consists of basic as well as more essential care given during general practitioner (GP) visits, short hospital visits and specialist appointments. Since 2006, the division between social health and private health insurance does not exist and is replaced by a universally compulsory social health insurance scheme. As described above, responsibility mainly lies with the insurance market. However, through extra governmental funding the universality of healthcare regardless of income is ensured. The third compartment deals with supplementary care such as cosmetic procedures or physiotherapy. For this compartment nothing has changed with the reforms, and patients need to buy supplementary cover from private insurances (Daley et al., 2013).

Every Dutch citizen needs to register with a GP who has the responsibility of a gatekeeper, controlling costs by keeping specialist referrals relatively low. Recently, some insurance companies have also started building primary care centers to lower costs for their patients. Secondary and tertiary care is mainly reached through GP referrals or the accident and emergency department. More than 90% of all Dutch hospitals are in private hands and operated on a not-for-profit basis. Specialists working in the hospitals are usually self-employed (Daley et al., 2013). Thus, the healthcare system can be compared with a shop-in-shop system.

Nevertheless, despite being considered a solid system, Dutch healthcare faces major challenges such as bureaucracy, a lower than expected competition between insurance companies and extremely high costs. In a McKinsey report (van Rooijen, Goedvolk, & Houwert, 2013), the company projected that if the costs for healthcare continue rising the way they did the past couple of years, roughly a quarter of the GDP and a quarter of the working population will be used for this purpose by 2040.

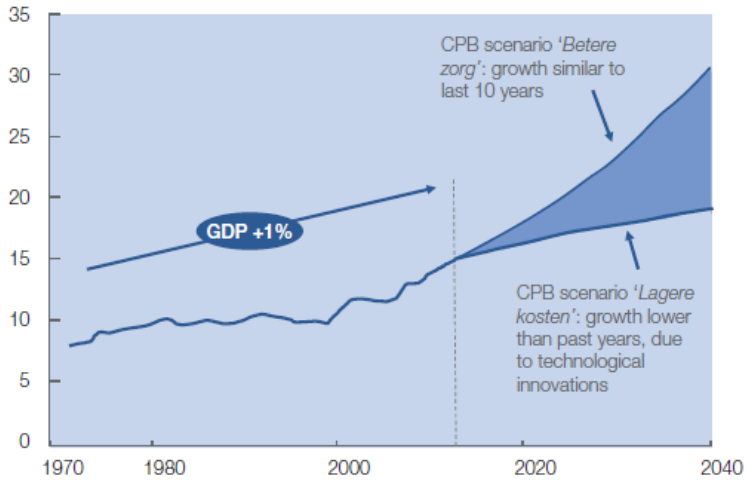

Figure 4: Healthcare expenditures as % of GDP, the Netherlands (van Rooijen et al., 2013)

Reasons identified for the above statement are among others an ageing population, an increase in chronic diseases and the right to be given the best healthcare. Additionally, new technologies and treatment methods are expensive. Consequently, the Dutch healthcare system needs to become more sustainable in the long-term (van Rooijen et al., 2013).

3.2 Sample and Procedure

After having understood the context in which the research is placed, the procedure to analyze the perceived motives for digitalization according to employees, how it is implemented and the difficulties in doing so need to be described. Research is conducted by means of an exploratory case study. Case studies are often used as a starting point for exploration of un- or slightly researched topics (Blumberg, Cooper, & Schindler, 2014). In the case of digitalization in the healthcare industry, little quantitative data is available due to the novelty of the topic. Additionally, privacy issues are of concern and consequently data restrictions make it difficult to access relevant information. In light of this, an exploratory case study helps to collect relevant information and allows to understand a rather broader topic in more depth, link it to existing theory and develop propositions that can be tested in the future (Blumberg et al., 2014).

One of the largest benefits of case studies is the flexibility of the approach. Instead of relying on one method for information gathering, case studies allow the combination of observations, primary

data collected through interviews and secondary data. Hence, triangulation is possible. At the same time due to the different perspectives that can be adopted, biases can be reduced (Blumberg et al., 2014; Yin, 1981).

Case studies exist in single or multiple form. With regard to the limited time frame of this study and the sensitivity of the topic, the research at hand analyzes a single case. Zuyderland Medisch Centrum in the Limburg area was chosen as hospital to conduct the analysis. The hospital as it is known today originated from a merger, effective as of January, 1st 2015, between Atrium Medical Center Parkstad and Orbis Medical and Care Concern Sittard-Geleen. The actual merger was the start of a substantial process of change to facilitate the integration of the two hospitals. Part of this were investments in digitalization that should also serve the purpose of becoming more patient-centric.

In order to gain in-depth information on digitalization within Zuyderland, semi-structured interviews were conducted. This approach ensures that a certain structure is followed in order to obtain relevant information while offering the flexibility to dig deeper into topics of interest and confirm or reject insights gathered in advance (Blumberg et al., 2014).

To obtain a holistic view on the topic, eleven employees working in different positions such as IT managers, nurses and doctors were interviewed with seven of the interviewees being male and four female. In this way, different perspectives could be considered and combined and biases could be reduced. A description of the interviewees' exact background can be found in appendix A. Participants were found through a first contact with an ICT manager via email who then referred further interviewees. 10 out of 11 interviews were conducted in person within the hospital and the 11th was led via telephone. They took on average 30 minutes and were all recorded and later transcribed. Medical and IT staff were partially asked slightly different questions as medical staff operates closer to the patients while IT staff has deeper knowledge on technological infrastructure. Data cleaning included solely the deletion of meaningless, unstructured thoughts that were not developed further by interviewees in the course of their interviews.

3.3 Measures and Analytical Strategy

Questions were developed after carefully reviewing literature and identifying important themes. Interviews are supposed to deepen the knowledge on these topics and thus questions were formulated to cover the three main categories of motives, strategy and difficulties in implementation. Since strategic choices and the implementation of a digital business strategy were identified as essential requirements for a successful adoption, items developed for this purpose in a previous study are included in the research (Hess, Matt, Benlian, & Wiesböck, 2016). The authors find that usage, structural changes as well as financial aspects are important factors, which are therefore also included. The three main pillars with a few subcategories are presented in the figure below. While reading literature and even more after conducting the interviews a fourth category with extra topics such as trends and future development could be identified. Therefore, a fourth pillar was added.

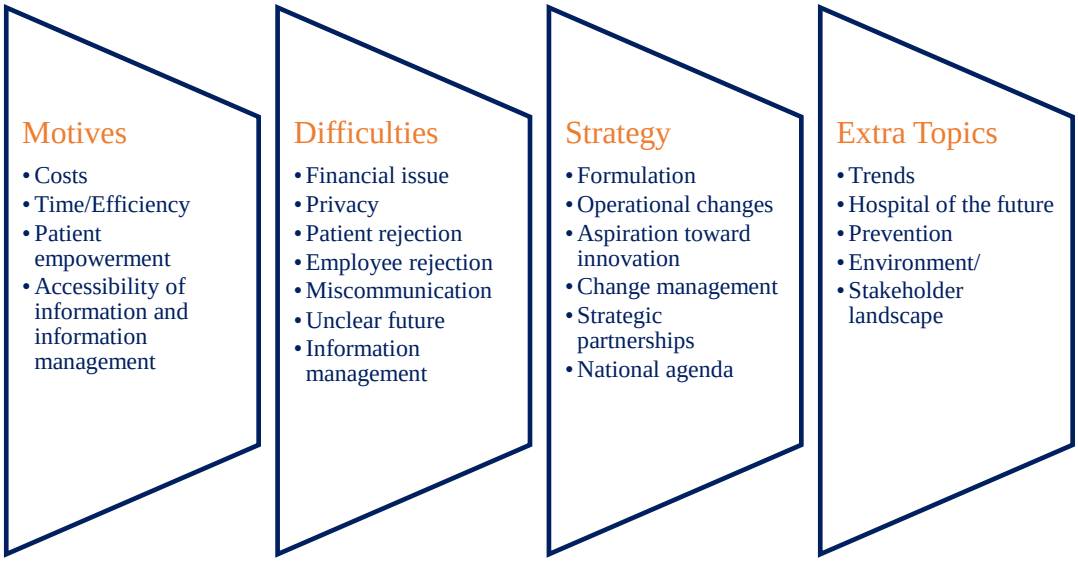

Figure 5: Measures

As can be seen in appendix B the measures described above were slightly adapted during the study. A code book was written a priori including the main topics and sub categories. These measures were worked upon and enhanced after conducting the interviews. The code book was organized in the three columns “code”, “definition” and “when to use” and can be seen in appendix B. To gain a first impression on the data and to possibly identify further themes, a word cloud was created using the online software Wordle. The word cloud is presented and described in section 4.4.

After completion of the code book, Excel tables, which are available upon request, were used to structure and organize the data collected through the interviews. For this purpose, each interviewee was sorted into a row and codes were sorted into columns. Codes belonging to the same category (motives, difficulties, strategy and extra topics) were marked in the same color to maintain an overview of themes related to each other. Subsequently, the interviews were re-read and statements were sorted to the different codes based on the code definitions established in the code book. Sorting the data in this way, patterns and therefore, the frequency with which certain themes emerged, could be identified, which helped in the analysis. Outstanding topics that were touched upon by many interviewees or delivered particularly interesting insights were further described, interpreted and compared with either other data sources such as news items or the hospital's website or existing theory. Based on these findings, implications could be drawn and propositions for testing in future studies were created. An overview of the described research process is provided in figure 6 below.

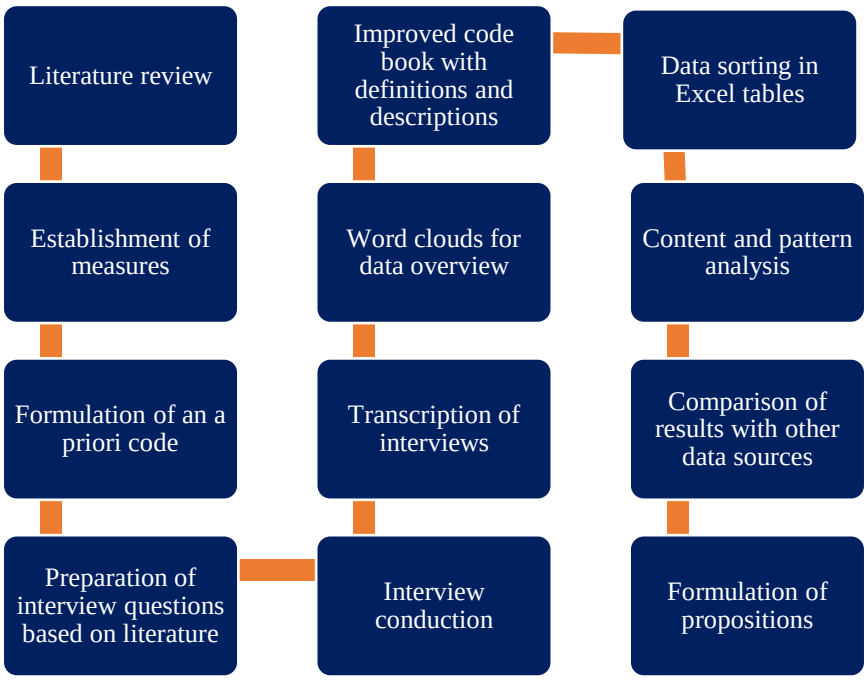

Figure 6: Overview of the research process

4 Analysis and Discussion

This chapter discusses the analysis of the qualitative interviews that were undertaken during the preparation of this thesis. In doing so, and according also to theory presented in an earlier chapter, the four main topics i) motives, ii) difficulties, iii) strategy and finally iv) extra topics are identified. In total eleven semi-structured interviews were conducted with nurses, doctors and administrative personnel of Zuyderland in the two hospital locations Sittard and Heerlen in the province of Limburg.

In the frame of the analysis each of the main topics and the factors that make it up as well as the answers of the interviewees to each of these factors are presented. However, before the four main categories are discussed, the interviewees view on digitalization in health is reviewed. Some of the interviewees perceive digitalization as a global trend as it is present in all sectors. Thus, they conclude hospitals also follow this trend. For others, it is both a result of the market environment, that asks for digitalization but also a way to optimize processes. Finally, other interviewees identify it as a trend but also as a necessity due to the merger they have been gone through. The main aim for them is to deliver a higher performance in qualitative factors like better approach with the patients, better care and better interaction between doctors and patients. Simultaneously, they also hope to achieve cost efficiency.

4.1 Employees' Identified Motives

Zuyderland's employees recognize many motives for digitalizing. One of the motives they see is cost savings as there is a general tendency to turn work simpler and with fewer people. If less people can do more work, efficiencies can be reached. Additionally, as one interviewee mentioned "if not everybody has to come to the hospital, we do not have to build all these big hospitals and all these expensive services". This statement directly relates with the above identified advantage eHealth is supposed to bring namely, fewer face-to-face contacts between patients and doctors (Weiner, 2012). In the future, it is predicted that everything that can be done from a distance, will be done, which means that patients will only have to go to the hospital in case of an emergency. Even though we are currently still pretty far from that, interviewees already see improvements and stated that the processes are a lot quicker now when compared to the past.

Linking to the above, one motive mentioned is this of time saving and efficiency. As an interviewee puts it when you have your patient and the computer next to each other you can write down the information as you are speaking and at the same time you are transparent as also the environment demands. The patient is seeing what the doctor or the nurse is doing and which data is recorded. Even though employees identify this simultaneous use of technology as a benefit, literature clearly shows that this is often not the case as many professionals prefer entering data afterwards to the system (Venkatesh et al., 2011). So even though it is considered a motive, in reality, it is often not taken advantage of.

Through digitalization "recalling multiple parameters of a patient" becomes easier. This can be attributed on the one hand to newest technology that allows for example several blood tests being made simultaneously and on the other hand to the possibility to store data in one place. Having these data and information available allows a better diagnosis but also the exchange of information with other hospitals as it is a quick and clean way to have the results of the examinations available when needed. This is also connected to the scalability of the hospitals since a few interviewees explained that many nurses have to frequently go out of the office to the patient's home. Consequently, there is a need of having their health record there as well. Simultaneously, the interaction between doctors and patients changes rapidly into a more active way of diagnosis via Skype or other forms that are facilitated by the major developments in ICT.

Interviewees explain that in the future a trend that might be observed, to also overcome difficulties about privacy, is that the health record will be owned by the individual and will not be property of the hospital as it currently is. So, a patient will manage his/her health record and hospitals will be obliged to provide all the information that was collected.

Registration and sharing of information is a very important issue because of the quantity of information gathered around the patient, which is not possible to record by any other means than ICT. Generally, one can make better decisions the more data is involved in the analysis. Using digital systems makes lots of data available which can be used for business intelligence process mining. Tools that are used to help with reporting and with source registration are EPD's and ERP's. Interviewees explain that electronic health records allow to have all information in one

place so that every care professional that needs to be in that digital system knows all the information about the patient except some things that the patients do not want included. The most important information encompassed are allergies or medicines that care givers need to know.

Touching upon this and with respect to patient empowerment, which is considered one of the main motives for digitalization (Åkesson et al., 2007), interviewees explain that there are people who want to be empowered and be active partners in their healthcare. One nurse said that the younger generation for example asks for more information and details on apps or on Facebook. As younger generations grew up with the technological developments, they are used to huge amounts of data and thus more selective in the information they process. In any case, providing the patient with more information e.g. showing him a movie or simply introducing the department does not only empower the patient but also tends to reduce his fear. Nonetheless, there are many patients that do not want to be empowered or as one interviewee put it that do not have the capacity due to their level of education. A concrete example that was given during the interviews is that when patients are asked what medication they use they answer very generic without e.g. mentioning the name of the drug they use. Moreover, it was explained that there are some people who just want so see the doctor physically sitting at the other end of the table and talk to him. One interviewee mentioned that especially older people perceive their doctor as a saint and simply execute what he says. These facts, hint at varying needs between different patients and show that even though digitalization is appreciated, the human interaction cannot and should not be replaced.

Currently, according to some opinions mentioned in the interviews, the main empowerment for the patient is Google, since many patients come to the doctors stating that they have read certain information online. Nonetheless, interviewees point out that the government has to interfere and point out to people that they should not believe everything they read, but to get their information at the right place. Thus, the importance of a health education becomes visible, which was also stressed in previous studies (Hilberts & Gray, 2014).

Another motive that was mentioned is that by using digitalization means, patient consultation is safer, as errors are reduced with all information being stored centrally. This is a huge advantage since in the past each doctor had his own status and there was no synchronization of data e.g. about

medications prescribed by other doctors. One example given by a nurse was that when a patient had to be brought to the operation room in the past a check list had to be filled out manually, which was time consuming and often led to errors. Nowadays, with everything being centrally stored in a digital manner, if a check-up is missing and bringing the patient to the operation room would be dangerous, a red light flashes signaling that the patient is not ready yet. In fact, as interviewees mentioned, data storage and information retrieval are better but still not optimized as nowadays lots of data is recorded but its linking needs to be further improved to create useful information.

Overall, it can be seen that employees have a good idea of why they need to digitalize and what drives them into that direction. An interviewee sums everything up by stating that "we need to do it because it's cheaper, it's better, it's faster and it optimizes our processes". The themes that are mentioned are to a great extent the ones presented in the literature as well. Nevertheless, Zuyderland's employees also see that even though there are certain motives and benefits involved with that, they are still in the process of getting there and have not reaped off the benefits yet. On the contrary, they identify new challenges that they themselves cannot undertake alone. Therefore, the government is mentioned as a policy creator to educate people and increase awareness of digitalization and active participation in healthcare. In the end, the patient needs to be well-off and satisfied since as interviewees mention, this is the ultimate measure of effectiveness.

4.2 Difficulties

As already described above, digitalization brings not only positive results but also difficulties interviewees clearly experience in their everyday work. Especially for the older medical personnel it is hard to process all the changes, as they have to register a lot of new information. Interviewees pointed out that some employees feel like the changes are heavy, and that they spend too much time with the computer and not with their patients. This is said to influence nurses and doctors particularly even though it seems like nurses that operate close to the patient's bed are affected even stronger.

At the same time an important challenge is the perceived underappreciation of human factors since the usage of ICT and robots is reducing the amount of human effort in work. For example, it is projected that there will be some robot nursing in the future and the nurses are worrying what their

function will be, if this happens. Instead of feeling empowered in their job, it seems as if they rather feel that power is taken away from them. As one nurse puts it, they have chosen their profession and have executed it with all their heart because they liked the closeness to the patient. In the future, this will be different but they do not know how much it will differ yet. Nevertheless, it is also stated by a number of interviewees that the human factor in the nurse cannot be taken over by a robot. Due to the emotional factor involved, people will probably prefer care being provided by a human being who is assisted by ICT. Propositions are formulated as:

P1: Increasing administrative tasks increases the likelihood of non-adoption of digitalization among nurses
P2: Decreasing time spent with the patient increases the likelihood of non-adoption of digitalization among nurses

Analysis shows that employees reject ICT when the user interface and the support provided by the IT department is poor. An example is that nurses have to give a lot of input in the system by hand. Whereas initially their function was to be helping the patients, now they also have more administrative duties compared to the past since the administrative burden has increased from 1-2 hours per day to 3 hours. Interviewees explain that when a process needs to change for nurses, they consider the best way to sit around the table with each other and discuss what is needed and how the work should be organized. So, communication is identified as an important topic in order to adapt processes.

At the same time, interviewees think that people are more afraid of change than fearing to lose their job due to digitalization. One interviewee referred to an image of people being asked “who wants change” and everybody being motivated and wanting it but as soon as they are asked “who wants to change” nobody is willing to take the lead. Changes are difficult and the older the people are, the more difficult it is, since they are not so much used to new technology. Consequently, more attention has to be paid to them and they need to be educated in using new technology or be trained in a new function. As was described in the literature review, change management is of uttermost importance. People need to be made aware of changes and the benefits they will personally receive and employee engagement is key for that (Stroetmann et al., 2006). Zuyderland

presents an even more special case here as the issue that the hospital faces is that there was a merger two years ago. Thus, people have to adapt to even more changes in structures, processes but also in their working environment.

Besides nurses, doctors face huge changes in their working procedures and they are described as a "group where you always have to pay special attention". Doctors are said to not like to type in information but they see the benefits of the system in collecting data, having longer reviews and sharing information among them. Yet, they also tend to be more conservative when making changes to their procedures and it is explained that they have the need to see, touch and treat a patient rather than to treat a patient behind a screen. Even if they are supported by systems and technology, one doctor said that most of them do not know what the possibilities in the future even are. Therefore, a lot of information on the benefits of using ICT also in the field of diagnosis should be provided to them to explain what this ICT change enables. Again, the government could play an important role here.

One issue that needs to be taken into consideration is the use of ICT tools and how this will influence the way doctors earn their money. Since diagnosis might be taken over by large companies using health tech, this is a potential threat. In any case, adoption is highest in disciplines that need a lot of information from other disciplines like oncology for example. In fact, multidisciplinary disciplines need all information available to get a right diagnosis. In contrary to the literature that finds that doctors do not favor ICT due to their fear of losing power (Bhattacherjee & Hikmet, 2007), the main issue identified here is that they simply do not understand what their possibilities are. Thus, once again digitalization is about information and education, change management, communication and setting goals for people. The hospital board needs to be clear about the objectives it has set and goals need to be communicated to the employees. This is currently lacking sometimes as people see changes but nobody has communicated to them the bigger picture and the reasoning. Thus, it can be stated:

P3: There is a positive association between the organizational efforts to communicate individual benefits of digitalization and the doctor's likelihood to adopt digitalization

Furthermore, it seems that there is an issue with the payment of doctors as interviewees mentioned that they get paid more when the patient comes to physically see them on a regular basis. Thus, doctors are skeptical because they might see their income drop, which is totally the opposite of an incentive. As an example, there is an eHealth application that is being implemented for people with Parkinson. There is a lot of added value for the patient and they generally like it as they do not have to go to the hospital that often. They manage themselves and whenever they face issues they can email their doctor. However, the problem is that a lot of the work the doctor has to do is not paid by the insurance companies because they only pay when a patient visits the hospital at least 15 minutes and sees the doctor. In the case that the doctor makes a phone call he is not paid.

Moreover, employees explained that there are cases that a department has to do things differently although they do not add any value for them. However, looking at the hospital in its totality or at the patient there is added value. The difficulty interviewees see is how that specific department can then be convinced to work in a different manner when they perceive that change as not being efficient. In healthcare, it is important that all actors collaborate and take actions together as everybody plays a significant role in their patient's health, sometimes smaller, sometimes bigger. When everybody has a common view and perspective a lot can be done.

One of the motives previously identified is the ability to exchange information, which is perceived as easier nowadays. Nonetheless even if it is a motive this does not mean that it cannot also be a difficulty since it touches upon the privacy issues. In order to share information, the patient has to confirm that (s)he agrees with that. As one interviewee mentioned privacy is important however more lives can be saved if certain data is stored. When an ambulance is called and it can retrieve patient information on the way they can already start doing their work and bring the patient to the right department right away.

Nevertheless, privacy issues and new circumstances also lead to patient rejection. As already described, some patients think their doctor knows everything so asking them to not physically meet but do the examination from a distance is something they do not like. A reason for that is that they need to take more responsibility for their own care process which is something that needs to grow. This could be done via education for example teaching children at school about prevention.

Interviewees observe that nowadays, people go to the hospital after they have a symptom, or even a break-down e.g. a heart-attack. However, it would be better to do that pro-actively as there are signs of getting a heart attack. To facilitate the process and the change for the patients, hospitals and doctors need to be transparent with the information and data that they receive. When a nurse or a doctor types information in front of the patient but does not speak to him or is not being transparent about what he is doing, this causes the patient to dislike the process. Even more so if information is asked multiple times, although the patient has already provided it. Thus:

P4: There is a positive relationship between the level of transparency and the patients' adoption of digitalization

When asked about digitalization and financial issues the answers that come up are that the investment hospitals have to make in ICT is a major issue and thus, before starting to make beautiful plans in which the use of ICT is optimized, a plan on how to invest on this issue needs to be created. Hence, again targets set by the hospital are important. Additionally, and to be able to implement real change, this issue needs to be discussed in a broader arena. Not only the board, not only the management of ICT, not only the board of the doctors but every single manager of the several departments in the hospital should discuss the issue of financing since the return on investment takes 5 to 10 years. Therefore, there should be a common opinion on whether to invest. There is also some governmental support like the VIPP[3] arrangement for hospitals to develop their patient portal so that patients can go to a website, see their own data and their own lab results and make an appointment online. This is an arrangement provided by the government in which hospitals are given 105 million euros over 3 years and have to develop the patient portal. This money should be used in a wise way and rules to be followed exist (NVZ, 2017). However, according to a manager there is not one department that arranges it for everybody, thus everybody can make his own choice with the money that is being given.

A further source of funding that was identified during the interviews are insurance companies that give money for eHealth innovation. Zuyderland was chosen by them to be a partner so there is

[3] Versnellingsprogramma informatie-uitwisseling patiënt en professional (accelaration program information exchange patient and professional)

some financing from this side. Additionally, there are also sponsors, which the hospital actively searches for, however they cannot be compared to the huge sponsorships undertaken in the US through for example sports teams. There is a department in the hospital that looks for sponsors and besides that every RVE[4] or care unit has a certain budget. Employees explain the procedure that when they ask for an innovation in IT they need to save some of their budget independently to invest. Processing all the information about funding, it becomes clear that a lack of communication and coordination between the departments might be counter-productive. As hospitals operate in a shop-in-shop system, the importance of a common goal that the whole hospital shares is once again shown. Nevertheless, looking at the hospital's organigram below in figure 7, it can be seen that there are multiple RVEs and thus multiple communication ways that need to be considered, which certainly impedes information exchange, which is another barrier that needs to be worked on.

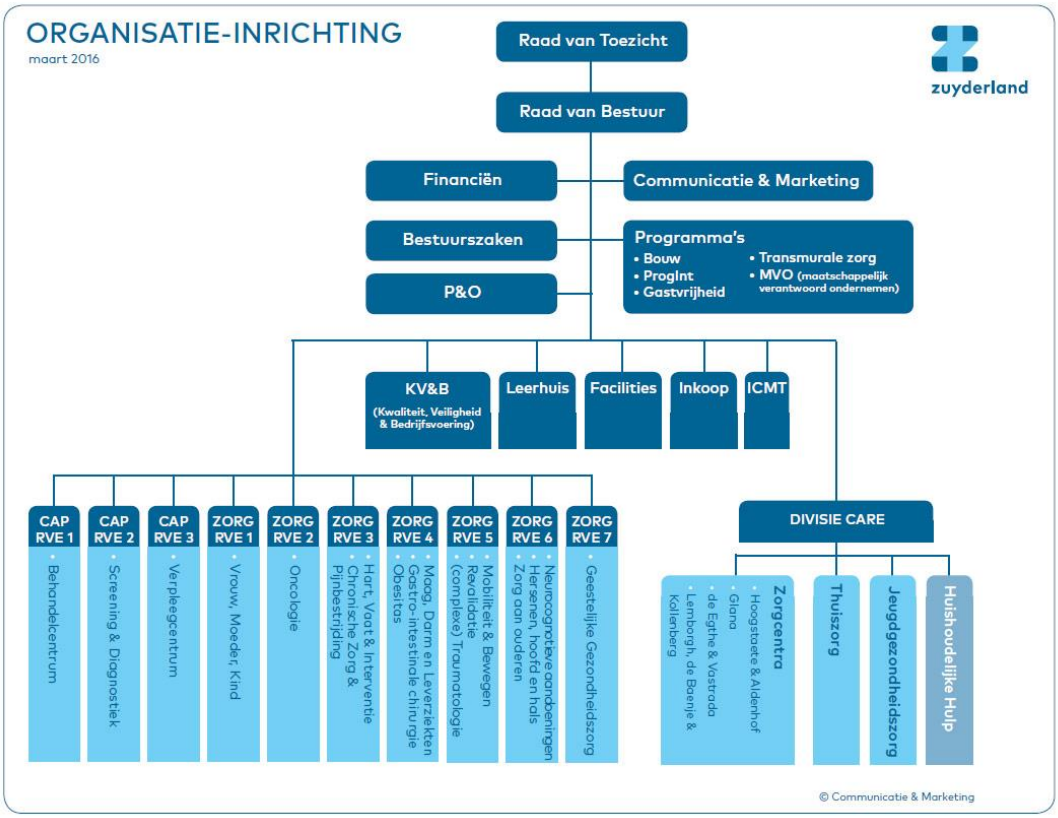

Figure 7: Zuyderland's organigram (Zuyderland, 2017)

[4] Resultaat Verantwoordelijke Eenheid (Strategic Business Unit)

All of the themes discussed above result in the conclusion that clear goals by the hospital's board, communication and cooperation between the functions are needed. This directly relates to the difficulties encountered for the implementation of a digital business strategy. According to the interviewees, the hospital needs to realize that sometimes investments have to be made before profit can be seen. Hospitals have often a very short-term focus and low budget so that they reject to use it for innovation, eHealth or new developments. However, if they do not act in time, they will face problems in the medium- and long-term. There are already some initiatives within but also outside the hospital, however, there is no communication about projects that have been implemented and therefore organizations have to reinvent the wheel many times. The government could serve as a mediator there in setting the focus toward a digitalized future and building a communication and information hub including successful projects that have been concluded.

Some interviewees stated that they think that in the future healthcare will move much more to an ICT business rather than a healthcare business and this can cause implications as not all processes can be supported by the ICT tools currently in place. There are a lot of systems and interviewees emphasized "the system has to support the process". When a process is not efficient, it is changed and if it works better it is adopted, yet it takes quite some time for ICT to change as well and it is also expensive. Thus, according to the interviewees, in the end the process is not leading around the patient but around the digital system. Even more, a difficulty mentioned was that when the computer fails, doctors immediately cannot work anymore because everything is in there and there is no backup system that would allow them to work further if the IT systems are down. Therefore, hospitals are becoming very dependent on their ICT system which interviewees perceive as dangerous. The following proposition can be formulated.

P5: Perceived dependence on the system impedes the adoption of digitalization

At same time the user interface of some of the tools is not great either as they were not designed in collaboration with the main actors but by ICT persons. This causes a mismatch and a less than perfect user experience due to the fact that IT experts often tend to think in IT solutions, forgetting about the specific use cases. This could be done by cross-functional teams where IT people team up with nurses and doctors to calibrate the system since the challenge for IT is to make the benefits

for healthcare professionals visible. The challenge for medical personnel is to provide uses cases to IT experts in plain language, in order to improve user interfaces. Literature supports this idea by stating that multidisciplinary teams are necessary for a successful implementation of digitalization (Stroetmann et al., 2006). Thus, we propose:

P6: Multidisciplinary teams facilitate the implementation of a digital strategy

Moreover, and with a future view towards the ideal hospital interviewees mentioned that it would be helpful if data and information from the different devices where automatically merged into the system instead of having to do the process manually. This could also enable big data analytics which currently are not used. Furthermore, one of the issues that was further identified is that digitalization is decentralized in the Netherlands whereas in other countries like in the UK or Spain they all work together, use the same systems and everything is arranged together. Hence, in the Netherlands another inherent difficulty is how to connect all the systems from all the different hospitals and organizations as the patient's mobility allows them to come from different hospitals and different healthcare organizations. Accordingly, the information of the patients is spread across organizations, and there also the privacy laws come in as on the one hand information about the patient needs to be shared for reasons of effectiveness but on the other hand, legislation about privacy permits the exchange of some data as the patient has to be protected.

4.3 Strategy

While discussing about digitalization in the interviews quite some strategic topics were highlighted as a primary point of course is the need to have a clearly defined strategy within the hospital but also as a society. In this frame education plays the primary role as it influences many aspects of life ranging from the health status of people to the employment status and the financial compensation. On its turn having a higher social economic status improves quality of life, improves lifestyle and prevents diseases. On a more specific level it seems that currently digitalization is driven by business needs and in fact there is no real IT strategy to support the business strategy and for some interviewees the objectives and goals of the hospital as such are not clear and are not communicated as much as needed.

In respect to innovation and the aspirations the hospital has, it collaborates with a healthcare insurance whose primary goal it is to investigate within hospitals about how eHealth functions, how it can be utilized and how it can be arranged financially so that doctors will use it. Looking at the strategic goals, interviewees mention that the hospital wants to be ahead and wants to be innovative however taking a look at the hospital's website and its presence in the news, its aspiration towards is not perceived as strongly. From a financial point of view, in order to be ahead, investments in innovation and eHealth are needed but most of the times IT has the overview and not the care professionals. Another crucial point is the behavior of the people that are working with ICT or other medical equipment. For doctors, innovation in the form of telemedicine does not bring up more money, but it brings less money so there is no stimulus to try and act on new things.

Concerning employee engagement, communication and partnerships a strategic thought interviewees had is to not simply communicate about the tools, but to let the users experience IT, which is elaborative and user friendly, in real situations. At the same time, what is also missing is people that are visionaries and have clear ideas about what should be developed and what the added value is for the patient and the organization. These people that have a clear view on the benefits and the costs could then also make other people enthusiastic as they could celebrate the successes a little more open in the organization. Employee engagement and convincing opinion leaders of the benefits of digitalization are therefore important (Stroetmann et al., 2006). Additionally, partnerships with other important actors are needed as "everybody is doing something innovation-related". Yet the main difficulty is, that there is no communication about the projects of the participants in healthcare. Currently, what can be also observed by the interviewees is that many companies like Microsoft and Google invest in healthcare. In fact, Google has a lot of technologies which are not approved right now by the FDA[5] but if they get their devices FDA approved a whole new area of healthcare will be created.

In respect to processes these will definitely change. If everybody's main focus in the hospital was to use eHealth and all the eHealth tools were available, then definitely the work and the contact with patients would be different. In the future, a lot will change with hospitals becoming virtual organizations with a limited number of buildings were very specific procedures will take place. In

[5] Food and Drug Administration

the frame of best practices most interviewees mention the US and hospitals like the Virginia Mason or Hopkins and Mayo. Yet, also the design of the hospital in Zuyderland is fairly the same as the hospitals in America and this makes it innovative. What is also mentioned is that it would be good to have common standardization forms and guidelines as all have to work, more or less, in the same way and that the process should be seen holistic as there are many partners such as the GP, third line parties, physiotherapists that have to communicate to maximize the added value for the patient. Nevertheless, unfortunately as one interviewee mentioned (s)he has now worked in four hospitals and in each the system is different even though there are some policies by the government. This is completely inefficient and a waste of resources. Thus, we suggest:

P7: Standardization within hospital departments increases the benefits of information exchange
P8: Standardization across hospitals increases the benefits of information exchange

4.4 Extra topics

Finally, in addition to the motives, difficulties and strategic aspects also other topics were discussed during the interviews. Among them was the hospital of the future and how the interviewees believe it will look like when it is fully digitalized. Most of them perceive that it will not be a hospital as it is known now. Hospitals will be getting virtualized, so in the future healthcare will be much more driven by the patients and the hospital will be just a place people need to visit for certain procedures that have to be in a clinical environment. Everything will be digital and the main technologies that will be used will be stem cells 3d printing, IT and robotics and images will be projected in a 3d mode. Also, the use of big data will be higher and therefore patients will not be going to the hospital unless it is absolutely necessary, in instance for a surgery. As an interviewee with ICT background put it, in the future healthcare will mean having one's own health environment in which all the information is collected and extra information one possesses about himself can be added. This data will be stored and a sort of engine does continuous diagnosis of the individual's situation and relates data. Other interviewees stated that also specialized medical personnel will be working, consulting and visiting patients when it is necessary based on the monitoring and before they have to go physically to the hospital. In case a patient should go, it will be for much shorter periods than a couple of years ago. Moreover, since data will be centrally available the different diagnostics will be run centrally and not by every specialist separately. For

most interviewees, we are far from this ideal and therefore we should try and get things correct at a first level in having systems that fulfill the goals and processes of the healthcare personnel and the patients, before we think about the future as we are just in the start of a marathon.

In the frame of innovation activities being undertaken in the hospital, interviewees stated that currently there is a new system for people to check in digitally but they do not feel that there is a concrete plan for the future. There are many loose activities undertaken but these have to be brought together and the communication about the vision should be clear. To give an example interviewees stated that they have EPD's and face time calls at home. It was also mentioned that the cardiology could monitor a patient at home, but that they were not sure if this is indeed done. What was also striking to hear was that years ago an appointment planning via SMS existed but that this was stopped because of financial issues. At the same time a doctor stated that they are starting a pilot for the eHealth program and for patients with sleep apnea. What they want to do is to see the patients once, and then all the machines have built in Wi-Fi connection with a modem so they will be able to read the data and see a patient through applications like Skype and change all the inputs when necessary. This is a pilot that is undertaken also in other hospitals in the Netherlands but it is not working well. Yet, here the system has been upgraded and they believe that it will have good results so that they can then show it to other hospitals and other departments.

As already identified above it can be seen that many good initiatives exist that need to be centrally controlled and coordinated better. Although there is knowledge of many activities that are undertaken, the learning for other departments is limited as communication does not appear to be a strong asset. Additionally, the hospital is willing to share their project in case of a success story with other hospitals to create synergies. Unfortunately, as was analyzed before, limited use of strategic partnerships is made and no platform for information exchange among actors is provided. These are developments that could benefit the healthcare environment greatly in the future.

Regarding the environment and the stakeholder landscape interviewees made a comparison between the Netherlands and the United States and stated that in the Netherlands solidarity is a cornerstone underneath the healthcare system and that this is different in many other countries,

especially in the USA where 20 million people had no insurance. According to them, this was fixed by Obamacare but currently the new administration wants to go back to the old system.

In respect to digitalization they think that the trend is already set, especially in the United States. A major drive towards digitalization is that healthcare costs increase every year. However, because of the high investments and because this industry does not have the kind of investment possibilities like banks or industries like the financial industry, hospitals are followers and they will not be an innovator unless they work together with Philips, IBM or Apple. In fact, Philips is changing its strategy and is moving more towards the medical field. That is identified as a huge opportunity for Philips and working with them would bring a huge advantage to the hospital as well. Thus, it can be generally said that:

P9: Strategic partnerships facilitate the implementation of a digital strategy

Concluding the analysis, data was reviewed for differences between medical and IT staff. For this purpose, word clouds were created, which are a visual representation of text data. Greater prominence is given to words that appear more frequently in the interviews. The larger the word in the visual, the more common the word was in the interview. The first word cloud that was created using Wordle is presented below.

Figure 8: Word cloud presenting most popular words in the interviews

Unsurprisingly the most prominent words were hospital, people, patients and care. As a hospital's main driver should be people and the well-being of patients these words were often used during the interviews. However, also words such as work, information, system and change were mentioned frequently showing that these are emerging themes and areas of importance due to digitalization. The fact that change is such a prominent word shows that digitalization brings about many changes that need to be managed carefully to ensure a smooth continuation of operations.

To see whether differences between medical and IT staff exist in their perception of digitalization, motives, difficulties and strategic choices, word clouds were also created dividing the two professional groups. The word clouds were almost identical to the one presented above and did not differ significantly between the two groups. However, diving deeper into the interviews there appears to be a difference in the extent to which the focus is set on the patient. While medical staff stressed the importance of the systems and digitalization supporting the patient and the processes he has to go through, IT staff rather talked about the systems and their efficiency as such. Additionally, one interviewee working in an IT function characteristically mentioned that humans will never be able to work as precisely and correctly as machines can. In contrast to that, medical staff explained that care could never be executed without human effort due to emotions and empathy that staff can show in antithesis with a robot.

Nevertheless, despite small differences between the groups most interviewees seemed to be in accord with each other, recognizing why they need to implement certain changes and identifying difficulties in doing so. Even though a few bottlenecks were identified, they all seemed to be aware of what needs to be done and very willing to act accordingly. Their descriptions of the ideal hospital of the future show that they recognize trends and move into the right direction. However, communication, a common goal and change management need to be improved within the hospital and support needs to be provided by the government and insurance companies to increase their ability to do so.

5 Conclusion, Limitations and Future Outlook

This paper has identified the motives that employees see for digitalizing, strategic choices and activities that are necessary and challenges in implementing a digital strategy. Employees are well-informed about trends and have a clear vision of the direction healthcare is taking. The most important motives that were identified were the improvement of healthcare service provision in form of increased efficiencies and reduced costs and a better information exchange between the patient and the professional, within the hospital, and among hospitals and professionals. In case of a successful management of all these incoming data, patient treatment can be improved by shifting much of the care process towards prevention. Additionally, cooperation will facilitate diagnosis and empower patients to be responsible for their own health. Through digitalization, errors can be reduced as well, increasing safety to a great extent.

Difficulties that are encountered are the unknown benefits digitalization will bring to healthcare overall and to the individual employees and professional groups specifically. As such, limited incentives are provided. Additionally, health care professionals feel that their power is taken away and that their work changes significantly involving less contact with the patient. Privacy concerns and legislation hinder the presumed benefits to be unfold limiting the perceived value of all the effort that needs to be invested. Moreover, communication within the hospital is limited, prohibiting transparency about innovation activities undertaken and limiting the opportunities of bigger innovations that would need combined manpower to develop. Lastly, funding remains a problem. Even though there are different ways to obtain money, communication with external parties but also within the hospital is lagging, making it difficult to decide the course of action.

In order to benefit from these developments and overcome difficulties of implementation, a strategy needs to be in place. The analysis showed that employees need guidance by the hospital's board first and by the government second. Thus, the board needs to provide a strategy as also a mission and vision, which should be accompanied by clear goals and targets that need to be achieved. Additionally, the different departments need to act as an entity, communicating more about the activities they perform. Additionally, they should celebrate more their successes. For this purpose, a change management is necessary. On governmental side, a national agenda for

health education would help to prepare patients and coming employees for the future. Additionally, if government would facilitate information exchange between actors such as companies and other health organizations, they could all benefit from each other and the formation of strategic partnerships would be easier.

As in every study there are a few limitations that need to be considered. First of all, even though the interview questions were partly based on previously used and tested items, no guarantee for full validity exists. Additionally, interviews were conducted face-to-face leaving limited time for interviewees to process the questions and structure their thoughts. Consequently, they might have understood questions in a different way than intended. Even more so because interviews were conducted in English with the interviewees' mother tongue being Dutch. Another issue could be unintended biases created while asking the questions for example by stressing certain words or non-verbally communicating with the interviewees.

Second, interviewees were found by referral of an ICT manager. Consequently, most of them have despite their current function some background and experience with IT. This might have had an impact on their perception of their current standing, viewing developments either more positively or more critically than other employees would. However, reviewing their responses, interviewees do not seem to be either positively or negatively biased. Moreover, this is not necessary a limitation as these are the people being more knowledgeable and interested in the topic thus following developments within the organization and in the environment more thoughtfully.

Third, the current status of the hospital being in a post-merger phase is certainly another limitation that should not be ignored. As the merger happened recently and is effective as of 2015, employees already have to go through many structural and organizational changes, which might have impacted their answers.

Lastly, the scope of the research might present a limitation as a single case was studied possibly limiting representativeness. Nevertheless, a deeper understanding of the topic was intended, which was fulfilled. Additionally, responses did not vary from theory to a great extent. To obtain further validation of the results, the conclusions drawn from the analysis and the propositions that were

formulated could be tested in future studies for further statistical evidence. For this purpose, either a larger sample within a hospital or across hospitals should be used to obtain statistically significant and relevant results and confirm the first findings presented in this work.

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7 Appendix

Appendix A – Description of the interviewees

Interviewee	Gender	Occupation
Person A	Female	- Leader in innovation-, eHealth- and ICT-related projects - Used to be a manager for neurology and the brain care unit
Person B	Male	- Enterprise architect - Alignment of business processes with applications, data and technical infrastructure
Person C	Male	- Radiology manager - Was involved in the digitalization of analogue films to a PACS[6] environment
Person D	Male	- Project manager for the integration (merger) of the two hospitals
Person E	Female	- Nurse - Studied health informatics afterwards and works in a bridge function between IT and medical staff
Person F	Female	- Nurse - Ward manager (policlinic, children's department) - Responsible for the organization of ICT
Person G	Male	- Nurse - Works as liaison between the hospital and GPs - Was involved in the implementation of SAP (as representative of the medical side)
Person H	Male	- Nurse - Project leader in the development of EHR - Head of the medical engineering department
Person I	Male	- Nurse - Leader of the daycare ward
Person J	Male	- Lung specialist - Involved in some ICT projects
Person K	Female	- Doctor (geriatrist)

[6] Picture Archiving and Communication System

Appendix B – A priori and new codes (in bold)

Category	Code	Definition	When to use
Motives	Cost saving	Costs refer to monetary expenses	Use this code when interviewees talk about decreasing costs/expenses due to digitalization efforts.
	Time saving/efficiency	This code refers to the speed with which activities can be undertaken	Use this code when interviewees state that their work/their activities/their processes are faster or when they say that activities can be undertaken in parallel.
	Patient empowerment	Patient empowerment refers to the patient becoming more actively involved in his health through higher mobility, the availability of more information and the ability to make own decisions concerning where to go and which treatment to get	Use this code when interviewees use the word "empowerment" or talk about patients being more actively involved in the care process. One example could be that patients are well-informed, obtain a lot of information and make their own choices. Use this code also when it is mentioned that patients are more mobile and choose the hospital freely.
	Safety	Safety refers here to the patient and his treatment (including medication, surgery etc.)	Use this code when interviewees talk about a decrease in mistakes or error. Use it also when they talk about having a complete set of information.
Motive/Difficulty	**Information Management/Accessibility of information**	The extent to which existing information and	Use this code when interviewees refer to information and data availability, storage,

		data can be found and shared	linkage and information exchange.
Difficulties	Costs	Monetary	Use this code when interviewees state that digitalization is expensive or that they have to make huge investments.
	➢ Funding	Public and private funding, sponsorships	Use this code when interviewees talk about asking for or receiving money from sponsors, private investors, prices etc.
	➢ Governmental support	In terms of money	Use this code when interviewees talk about governmental funding.
	Long-term benefits unknown		Use this code when interviewees state that they do not know what the developments in the future will be and if the benefits prevail. Use it also when they mention the return on investment (ROI).
	Privacy issues	Relate to data restrictions and legislation about data privacy and protection	Use this code when interviewees talk about patients feeling uncomfortable and not wanting to share information. Use it also when they talk about laws and regulations for data sharing.
	Patient rejection	Refers to patients not accepting and not adapting to digitalization	Use this code when interviewees mention that patients do not want digitalization, that they do not see the benefits for it, do not understand it or that they prefer the traditional way. Also use it when reasons for

			patient rejection are given.
	Staff rejection/underappreciation of human factors	Refers to staff not accepting and not adapting to digitalization	Use this code when interviewees talk about employees not understanding how to use the new systems or fearing that they might lose their job. They might also talk about staff being frustrated. Use it also when other reasons for rejection are given.
	➢ **Doctors as special case**		Use this code when doctors and the reasons for their rejection are mentioned.
	➢ **Dependency on the system**		Use this code when interviewees say that they are relying too much on systems and depend on them. Also use it when they say that they cannot work properly without digitalization, their computer or their mobile phone.
	Communication	The direct exchange of information between patient-doctor, doctor-doctor, doctor-other employee, hospital-hospital	Use this code when interviewees mention that different parties speak different languages and do not understand each other. Also, use this code when it is stated that they do not know what others are doing and what is happening in other areas of the hospital or in other hospitals.
	National agenda	Refers to clear goals for setting the course for	Use this code when interviewees mention that they do not know

		action in healthcare	what is happening outside the hospital (in terms of digitalization projects) and that the government does not provide them with help.
Strategy	Defined strategy		Use this code when interviewees mention that the hospital/the board has provided them with a digital strategy and goals.
	Aspirations towards innovation	Refers to the extent to which innovation is wanted and pursued	Use this code when interviewees talk about their hospital's innovativeness.
	Change management		Use this code when interviewees talk about change within the organization.
	➢ Employee engagement		Use this code when interviewees talk about actively engaging employees to communicate the benefits of digitalization. Also use it when they refer to opinion leaders and talk about experiences.
	Partners	Strategic partnerships with other hospitals, companies and startups	Use this code when interviewees refer to other companies or other hospitals and when they talk about working with them and creating synergies.
	Operational changes	Changes in the day-to-day business	Use this code when interviewees talk about concrete changes in their jobs or in the way activities are undertaken.

	National agenda	See above	See above
Other topics	Trends in digitalization	Future outlook	Use this code when interviewees talk about developments in the future.
	➢ Hospital of the future		Use this code when interviewees talk about how hospitals will look like in the future and how they will operate.
	Prevention		Use this code when interviewees talk about the importance of acting on time or use the word “prevention”.
	Environment/stakeholder landscape		Use this code when interviewees talk about stakeholders and about the environment’s demands.